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TOPIC OF RESEARCH

"STUDIES ON SEED BORNE DISEASES OF PULSES AND ITS BIOLOGICAL MANAGEMENT"

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STUDIES ON SEED BORNE DISEASES OF PULSES AND ITS BIOLOGICAL MANAGEMENT

INTRODUCTION:

India is striving hard to increase agricultural production with a view to accelerate food production to feed the ever increasing population through an integrated approach towards the application of farm technology (Neergard, 1970; Dharamvir, 1974), Seed plays an important role in disseminating pathogenic organisms to areas from hitherto, they have been absent. To check the spread of such pathogens, seed health testing procedure is necessary.

Seeds are generally associated with certain saprophytic or parasitic microorganisms which perpetuate in the seed lots on the advent of favorable conditions. Pathogens present in almost any seed lot of economically important crops which may be disastrous if introduced into disease free areas. Therefore, seed must be "Substantially free" from inoculum with high level of germination and purity before sowing. According to recent reports of the World Health Organization, 1 to 4% of the world's grain production is lost due to microbial spoilage.

Seed constitutes an essential component of agriculture. About 90% of all food crops are propagated through seeds. They act as passive carriers of fungi, bacteria, viruses and nematodes. Bakers (1974) defined seed borne pathogens and a large number of pathogens belonging to ninety fungal and five bacterial genera are seed transmitted (Pathak, 1980; TomLinson, 1987).

Among the various microorganisms associated with seeds, fungi play an important role in determining the quality of grains and seeds (Mirocha, et.al. 1976; Dennis, 1977; Gupta, 1994).

India stands first in production and area under pulses in the world. The pulses crop like Gram (Cicer arietinum L.), Pigeon pea (Cajanus cajan L.), Green gram (Vigna radiata L.), Black gram (Vigna mungo L.) and Lentil (Lens culinaris Medik.) are the important crops grown in Marathwada region of Maharashtra during both kharif and rabby seasons.

In the Indian context, where pulses have been a part of daily diet, maximizing production and enriching nutrition through pulses is a better and acceptable alternative.

Pulses (Gram, Pigeon pea, Green gram, Black gram, Lentil) belong to the family Leguminosae. The pulses (Gram, Pigeon pea, Green gram, Black gram, Lentil) are next in importance to cereals as a source of human food. They contain more protein materials than any other vegetable product. The pulses have been cultivated and used for food for centuries all over the world. The pulses figure prominently in crop rotation and in the mixed cropping commonly practiced in Indian agriculture. About one-seventh of cultivated area in India is under pulses (Mehta, T. R. 1954) of which about 37% is occupied by gram and 13% by the pigeon pea. During 2001-02, the total area under pulse crop cultivation was 21.7 million hectare and the yield was 13.2 million tones.

Gram or chick peas are also called garbanzo beans. This is the most important pulse in India. It is native of South Europe and grown in Uttar Pradesh, Punjab, Maharashtra, Rajasthan, Bihar and Madhya Pradesh. In India, gram is sown as rabbi crop at the end of the rainy season. It occupies over 10 million hectares yielding about 5.4 lakh tones of grain annually in India. In Maharashtra, the area under production is 7.96 lakh hectares and the yield is 4.49 lakh tones (Statistical Abstract, India, 2003)

Pigeon pea is the most important pulse crop of India. D.N. De (1974) has provided strong evidences to prove that Pigeon pea has originated in the

Peninsular India. It was cultivated in Egypt even before 2200 B.C. Now it is cultivated in all tropical areas of the world. Africa, America, Australia, India and West Indies are important Pigeon-pea producing countries. In India, it is mostly cultivated in Uttar Pradesh, Madhya Pradesh, Bihar, Maharashtra, Andhra Pradesh and Tamil Nadu. Pigeon pea consists of 57.2% carbohydrates, 22. 3% proteins, 1.7% fats, and 3.6% minerals. Cajanin and Concajanin are two important proteins present in Pigeon pea. Pigeon pea mostly used as pulse.

Green gram is one of the common pulses in India, where it has been cultivated since ancient times. The crop is also grown in some parts of South-East Asia, Africa, West Indies and America. In India, it is widely cultivated in Maharashtra, Uttar Pradesh, Gujarat, Tamil Nadu, Andhra Pradesh and Bihar occupying an area about 2.4 million hectors with a production of 1 million tones of seeds. It is cultivated mainly as Kharif crop. The dried seeds of green gram contain 23.6% proteins, 58.2% carbohydrates, 3.3% fibres, 1.2% fats, and 4% minerals.

Black gram is common pulse of India. It is believed to be a nature of India. It is cultivated in many tropical and sub-tropical countries of the world. In India, it is grown over nearly 2.5 million hectors of land with a production of about 0.7 million tones. It is mainly grown in Madhya Pradesh, Uttar Pradesh, Punjab, Maharashtra, West Bengal, Andhra Pradesh and Karnataka Dried seeds of black gram contain 23.4% proteins, 57.3% carbohydrates 1.0% fats, 3.8% fibres and 4.8% minerals. They are especially rich in phosphoric acid.

The lentil (Lens culinaris Medik.) is an edible pulse. It is a bushy annual plant grown for its lens-shaped seeds. Lentils are used throughout South Asia, the Mediterranean regions and West Asia. With about 30% of their calories from protein, lentils have the third-highest level of protein, by weight, of any legume or nut, after soybeans and hemp. Proteins include the essential amino acids like

isoleucine and lysine. Lentils are an essential source of inexpensive proteins in many parts of the world, especially in West Asia and the Indian subcontinent, which have large vegetarian populations.

Review of Literature:

Seeds are the different carriers for survival large scale and long distance spread of pathogenic organisms both externally and internally and pulses (Gram, Pigeon pea, Green gram, Black gram, Lentil) seeds are not and exception. Infected or contaminated seeds prove hazardous for the seeds as they cause pre and post emergence losses and finally resulting in reduced germination of seeds, reduction of yield and also spoiled the quality of seeds during storage.

The architect of pigeon pea plant is very sturdy yet it attracts 69 fungal, 3 bacterial and 19 viral pathogens causing various diseases (nene etal 1996).

The present review deals with the work done on detection, identification, estimation of mycoflora associated with mycoflora with pigeon pea seeds and their management. Studies pertinent to pigeon pea seed health were conducted by various workers reviewed. Detail accounts of methods used in seed health evaluation was given (ISTA, 1976 and Neergaard, 1977).

Charya & Reddy (1979) detected more fungi on the logal pigeon pea variety than hybrids and found that the blotter paper method revealed more seed borne mycoflora than the agar plate method.

Kumar & Srivastava (1985) reported 17 fungal species associated with abnormal looking, wrinkled and discoloured seeds of the cultivars prabhath, T-21, T-7, and T-17.

Lokesh et al (1988) isolated five mycoflora species including *Alternaria alternata and cladosporium* from developing pigeon pea seeds.

Pandey et al (2007) detected 17 fungal species on stored seed samples of pigeon pea collected from 18 places Eastern Utter Pradesh. Among these *Aspergillus flavus* and A. Niger were predominant.

Jalander and Gachande (2011) isolate *Fusarium oxysporium*, *F. Sp. Udum* from infected roots of different varieties of pigeon pea.

Mallesh et al (2008) evaluated the efficacy of seven different antifungal compounds, bio agents, and chemicals against storage fungi.

Singh et al (2011) were evaluated eleven fungicides for seed treatment out of them Bavistin 50 WP was found most effect in seed germination.

Mukadam (1997) published a book "The illustrated Kingdom of Tungi." and Mungikar (1997) published a book on introduction to biometry.

Jackson (1963) reported seed borne fungi in peanut seed stocks.

Nath et al. (1970) reported the seed borne fungi of Mung bean.

Agrawal et al. (1972) reported seed borne fungi of Rice, Wheat, Black gram, Green gram and Soybean grown in India.

Singh et al. (1973) and Iqbal Singh et al. (1975) reported seed borne fungi of green gram seeds.

Suhag (1973) reported seed borne fungi of gram (Cicer arietinum L.) seeds.

Shukla and Bhargava (1977) isolated Fusarium solani from different seeds of pulses and oil crops.

Moubasher et al. (1979) reported that among sixty six fungal species, A. nidulans, Humicola grisea and Penicillium funiculosum were found to be most common on peanuts from Egypt.

Zote (1979) studied the aspects of seed health testing and fungicidal seed treatment with reference to seed borne fungi of sorghum and mung bean.

Deo and Gupta (1980) reported mycoflora associated with seeds of gram.

Kumar et al. (1983) reported seed borne fungi of Urd bean (Vigna mungo L.).

Sumar and Howard (1983) observed seed microflora of pulses grown in Alberta, Canada. Similarly Abdel Hafez (1984) reported mycoflora of pea seeds in Saudi Arabia.

Kumar and Shrivastava (1985) observed fungi associated with pigeon pea seeds, their effects and control.

Aims & Objectives:

1) To study the seed borne diseases of pulses (Gram, Pigeon pea, Green gram, Black gram, Lentil).

2) Collection of seed samples of **different** varieties of pulses (Gram, Pigeon pea, Green gram, Black gram, Lentil) from various regions of Marathwada.

3) To assess seed mycoflora by employing various techniques as recommended by ISTA (International seed testing association).

4) Incubation of seed plate to find out the seed mycoflora of pulses (Gram, Pigeon pea, Green gram, Black gram, Lentil).

5) Identification and Isolation of seed borne pathogen.

6) To study pathogenicity of seed borne pathogen

7) To analyse the results and produce the statistical data.

8) To provide suitable control measures against seed borne pathogen of pulses on the basis of obtained results.

9) To study the effect of biological control, fungicides and medicinal plants in control of seed borne pathogen.

Materials & Methods:

The following instruments may be used in the present study as per requirements.

1) Auto clave for sterilization.
2) BOD incubator for incubation.
3) Compound microscope for identification of mycoflora.
4) Hot air oven for glassware sterilization.
5) Laminar air flow for isolation & purification of mycoflora.
6) Electronic digital balance for weighing.
7) Forceps, needls, blades, knives and scalpel.
8) Spirit lamp for sterilization.
9) Microwave oven for melting of media.
10) Growth chamber.
11) Stereo – Binocular microscope for studying the habit characters.
12) Micropipette.
13) Centrifuge.

Collection of Seed samples: The methods described by neergard (1973) have been adopted for the collection of seed samples. Accordingly, seed samples (1/2 kg seeds in each sample) are to be collected from fields, store houses and market places in Marathwada region. A composite sample is prepared by mixing the individual samples together, preserved in Jute bags at room temperature during the studies.

Assessment of Seed mycoflora: The seed born fungi of pulses (Gram, Pigeon pea, Green gram, Black gram, Lentil) would be detected by agar plate and blotter test methods as recommended by ISTA (International Seed Testing

Association-1966). The procedure of agar plate and blotter test methods was described by earlier workers (De Tempe 1970, Neergard 1973, Agarwal 1976).

Identification and isolation of seed borne fungi: The plates are to be incubated at room temperature (27+ 2^{θ}c) for 8 days. The fungi occurring on each and every seed to be identified on the basis of sporulation and morphological characters by observing under microscope with the help of manuals. The pure culture of the identified fungi are to be prepared and maintained in PDA slants and media used to isolation studies.

Biological control of seed borne fungi

The discriminate use of fungicides all over the world in general and in India particularly has badly damaged our environment.

Time has come to curtail the use of fungicides and option for control of disease by biological control which is target oriented.

As compared to chemical control, biological control usually lasts longer and it may prove economical.

The control of seed borne pathogens is achieved by two methods, such as

1. Leaf extracts

2. Antagonists

Plan of work:

1st Year:- Collection of seed samples of different varieties of *pulses* (Gram, Pigeon pea, Green gram, Black gram, Lentil) from pulses Research Center, Badnapur.

2nd Year:- Incubation of seed, isolation of pathogen and study of pathogencity, effect of fungicides, bio fertilizers and medicinal plants.

3rd Year:- Compilation of results and produced the statistical date of research work.

Result & Discussion:

The result of different studies conducted on pulses seed (Gram, Pigeon pea, Green gram, Black gram, Lentil) health evaluation and discussion to be done and prepare statistical data. Identifying the characters of detected mycoflora.

Conclusion:

Fungicidal treatment of pulses seeds (Gram, Pigeon pea, Green gram, Black gram, Lentil) reduce the frequency of seed borne mycroflora and thereby increase the seedling vigour.

Suggestions for future research work:

1) Seed health evaluation need to be conducted at regular intervals an all the important pulses (Gram, Pigeon pea, Green gram, Black gram, Lentil) varieties.

2) For increasing the detection efficacy modification in detection methods to be done.

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